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**SECRET**BIBLIOGRAPHY OF <sup>reports</sup> MATERIALS ON ISOTOPES <sup>for Rus. pub.</sup> PUBLISHED IN THE USSR

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An investigation has been begun in Kirgis SSR into areas producing uranium. The investigation, begun last year, of uranium and thorium producing regions in the Kenin section of Frunze is being continued. Groups of geologists and chemists from Leningrad and from the Kirgis Geological Investigation [Committee] are participating in the survey using the latest survey equipment. They are to decide on the industrial value of the mines and financial arrangements.
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35. Direct Methods of Isotopic Identification in Nuclear Reactions, A. P. Grinberg, Uspekhi Fizicheskikh Nauk, XXXIV, 2, 1948.
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The spectral distribution  $W_n(n)$  where  $W_n$  = energy,  $n$  = order of the harmonic, of the electromagnetic emission of an electron accelerated in a betatron or synchrotron, having, at energies of the order of  $10^8$  e. v. its max. in the visible region, is called. in the ultra-relativistic case, and is confirmed by the identity of with the expression of the total emitted energy,  
where radius of the trajectory,
92. New Data on the Geochemistry of Rare Cases, V. G. Khlopin and E. K. Derling, DAN, LXXI, 297-300, 1948.  
The accumulation of heavy isotopes of Xe in old U minerals and the Xe content in uraninite were detd. This suggested an exptl. verification of the

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new method and of the formula for detg.  
the age of the U minerals in relation to  
the Xe: U ration in them. The formula  
reads:

93. Dynamics of ion Exchange, D. D. Ivenenko,  
V. V. Rachinskiy, T. B. Gapon, and E. N.  
Gapon, DAN SSSR, LX, 1189-92, 1948:

The distribution of phosphate ions  
along a vertical column of  $\text{HNO}_3$ -treated  
 $\text{Al}_2\text{O}_3$  was detd. at the origin, after  
one elution with  $\text{H}_2\text{O}$ , and then after 3  
consecutive elutions with excess 1  
 $\text{NaOH}$ . The latter elutions give rise  
to 2-3 max. along the column. At pH  
6.2, 63.67% of the phosphate is present  
as  $\text{H}_2\text{PO}_4$ , 36.32% as  $\text{HPO}_4$ . The ion  
exchange may be represented by ( $\text{Al}_2$

and the max. are roughly accounted  
for by the higher adsorbability of  
 $\text{HPO}_4$ . The exchange isotherm  $S_1$

( $S$  = equil. adsorption in mg. equiv./g.,  
 $C$  = equil. concn. in mg.-equiv./ml.)  
gives the correct distribution curve with  
 $K = 0.01$ .

94. Fizicheskaya Khimiya, A. I. Brodskiy,  
Vols. I and II, 6th edition, Moscow-  
Leningrad: Goskhimizdat, 1948,  
30 rubles.
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Hydrogen, B. V. Ayvazov, and M.B.  
Neyman, Uspek Fiz Nauk, XXXVI,  
148-80, 1948. A critical review.
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Among  $\text{H}_3\text{PO}_2$ , B. Neyman, and A. N.

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Nesmeyanov, DAN SSSR, Nauk, LXVII, 463-6, 1948.

In equimol. mixts.  $\text{NaH}_2\text{P}^*\text{O}_4$ ,  $\text{NaH}_2\text{PO}_4$ , 1, 0.25, or 0.1 M ( $\text{P}^* = \text{P}^{32}$ ), heated 80 hours in closed vessels, and analyzed by the  $\text{Mg-NH}_3$  method, no isotopic exchange was detected by radioactivity measurements up to  $280^\circ$ , at which temperature all the  $\text{H}_2\text{PO}_2$  was oxidized to  $\text{H}_2\text{PO}_4$ . A similar neg. result was found with  $\text{H}_3\text{P}^*\text{O}_4$ ,  $\text{H}_3\text{PO}_3$  up to  $280^\circ$  at which  $\text{H}_3\text{PO}_3$  disappears. Addition of 0.0005 M  $\text{NaOH}$  accelerates oxidation of  $\text{H}_3\text{PO}_2$  and of  $\text{H}_3\text{PO}_3$  to  $\text{H}_3\text{PO}_4$ , considerably, oxidation being complete at  $195^\circ$ . On the other hand, addition of 0.0005-0.001 M  $\text{HCl}$  increases the stability of  $\text{NaH}_2\text{PO}_2$  which, in mixt. with  $\text{NaH}_2\text{P}^*\text{O}_4$ , could be detected and sepd. even after heating to  $300^\circ$ . However, no exchange of  $\text{P}^*$  was observed even under these conditions.

97. Use of Radioactive Indicators in Analytical Chemistry, M. B. Neyman, and A. N. Nesmeyanov, Uspekhi Khim. XVII, 401-31, 1948. Critical review.

98. Content of Helium in Beryllium, Boron, and Lithium Minerals, V. G. Khlopov, DAN Nauk SSSR, LXVI, 893-4, 1949:

Helium found in Be and Li minerals is accumulated as a result of selective occlusion by the minerals of He dissolved in the magma in the course of crystn.; the B minerals probably are accounted for similarly. The basis for the conclusion lies in the  $\text{He}^3/\text{He}^4$  ratio of 0.5-12  $10^{-7}$  from such minerals, while He derived from nuclear fission is essentially

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99. Further Regularities in the System of Isotopes, M. A. Levitskaya, DAN SSSR, LX, 45-6, 1948:

The following addnl. facts have been noticed in connection with L.'s isotopes table. An even nucleus below  $Z = 32$  usually has more isotopes which are heavier than the most abundant isotope than isotopes which are lighter. The change ( $N$ ) in the no. of free neutrons in going from and

$N$  usually is -1. It is suggested that the uneven nuclei below  $Z = 32$  were formed from heavier isotopes, and that those beyond  $Z = 32$  were formed from lighter isotopes. Up until  $Z = 32$ , only the "external" neutrons, whose binding energies are low, are active in binding new protons to the nucleus. Above  $Z = 32$ , the "internal" neutrons are active, but no generalities were observed.

100. Determination of the Isotopic Composition of Oxygen due to Photosynthesis, A. P. Vinogradov and R. V. Tey, Compt Rend Acad Sci URSS, LVI, 59-60, 1947, (in English):

On repeating former expts. on the isotopic compn. of O due to photosynthesis in *Elodea canadensis*, V. and T. found that the increase,  $d$ , in the  $d$  of  $H_2O$  prepd. from O obtained by photosynthesis over that of  $H_2O$  prepd. from O obtained by the electrolysis of water varied from 2.0 to 2.3 (av. 2.2) and differed greatly from the both of O from air ( $d =$  and from  $CO_2$   $d = 11.5$ ). Thus, during photosynthesis O is liberated as a result of  $H_2O$  dehydrogenation rather than as a result of the reduction of  $CO_2$ .

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101. Variation in Deuterium Concentration in the Process of Melting Ice, R. V. Tey, Compt Rend Acad Sci URSS, LIII, 529-32, 1946, (in English):

The d. and n of cleaned samples of snow from the Moscow and Yaroslavl provinces and of ice samples were measured to det. the change of D concn. during melting. The D content of the water formed upon melting depended on the stage of melting, being low at first and increasing as melting continued. The lower D content in the first stages persists for a longer time if the melting takes place in contact with the water formed. The increase in D concn. in the solid phase proceeds at a much faster rate than would be expected from the ratio of the initial and residual amts. of ice.

102. Isotope Composition of Mineral Waters, R. V. Tey, Compt Rend Acad Sci SRSS, LIII, 135-7, 1946, (in English):

Previous d. detns. of 35 natural waters showed the least mineralized to have the lowest d., which resulted from soil layers adsorbing D during percolation. Isotopic exchange has also been considered responsible for d. decrease, by substitution of light H for D or O exchange. Waters showing reduced d. have thus been assumed to have a vadose origin. Investigation by the author of carbonate mineral waters indicates a const. concn. of the  $C^{18}$  isotope irrespective of the  $CO_2$  content.

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103. Effect of Radioactive Elements Upon Development of Root-Node Bacteria and Upon the Assimilation by Them of the Molecular Nitrogen of the Atmosphere, A. A. Drobkov, Compt. Rend. Acad. Sci., URSS, XLIX, 224-6, 1945:

In the absence of radioactive elements no nodules were formed on the roots of peas growing in water culture and no N was fixed even when the medium contained B and Mn and was inoculated with root-nodule bacteria. The addn. of Ra to the culture promoted the development of nodules and increased plant growth and the plants assimilated nearly twice as much N as a result of fixation as the Ra-free controls, even when normal doses of N were contained in the nutrient soln. The optimum dose of Ra was 10-10g. per l. of nutrient but the plants could stand 10 and 100 times greater doses.

104. The Angular Distribution of Pairs Produced by  $\alpha$ -rays from Th C", B. Dshelopov and N. Vlasov, J. Exptl. Theoret. Phys., USSR, XV, 685-91, 1945, English Summary:

The apparent dependence of the divergence angle of positron-electron pairs on the target's Z (L. V. Groshev and L. M. Frank, C.A. 32, 6941<sup>2</sup>) could be due to the variation of scattering power among the gases used simultaneously as targets and cloud-chamber gases. B. AND V irradiated 11- and 23- Pb foils and 120-, 240-, and 500- Al foils with  $\alpha$ -rays from ThC", observing the no. of coincidences per hr. as a function of the angle formed by the axes of the G. M. tubes, which converged on the target. The resolving time of the coincidence circuit was  $2.5 \cdot 10^{-5}$  sec. The exptl. coincidence rate was 50-200% of background rate. The curves for positron-electron path angle vs. no. of

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pairs per hr. coincided almost exactly for the 11- Pb and 240- Al targets; thus the rate of pair-formation in the region measured (5-30 per hr.) was not a function of  $Z$ .

105. Beta-Ray Spectrum of  $K^{40}$ , B. S. Dabolepov, M. Kopyeva, and E. Vorob'ev, Phys.Rev. , LXIX, 538-9, 1946:

The Beta-spectrum of the reaction  $K^{40}$  Ca 40 has an upper limit of 1350 50 e.kv., and a single max. at about 400 e. kv. A special magnetic spectrometer with 7 counters is described.

106. Nuclear Isomers with Long Lifetimes, L. I. Rusinov, and Ya. M. Igel'nitskiy, DAN SSSR XLVII, 338-41, 1945:

The lifetime of nuclear isomers with respect to radiation transitions can be estd. by use of a no. of formulas derived on various assumptions concerning the nucleus. This computed lifetime should then be decreased, because of the possibility of discharge of the isomers by internal electron conversion, which must be further calcd. by special formulas. L. D. Landau's formula for estn. of the lifetime of nuclear isomers was derived by assuming that the nucleus radiates as a "one-particle" model. It differs from the other formulas in that allowance is made for the influence of internal electron conversion. The effective radius of the nucleus is taken as  $5 \cdot 10^{-13}$  cm. The lifetimes in yrs. of the investigated elements are:  
Cd<sub>48</sub> (all of the isotopes)

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107. Isotopic Composition of the Waters of Upper Svanetian Glaciers, R.V. Teyz and K. P. Florenskiy, DAN SSSR, XLVII, 166-7, 1945:  
D content of glacier water is lower than that of Ingur River water; heavy-O content is equal or somewhat higher. Isotopic compn. of glacier water and river water in Upper Svanetia is similar.
108. The Application of the Isotopic Method to the Investigation of the Mechanism of Chemical Reactions. III. The Mechanism of the Reaction of Acid Anhydrides with Alcohols, N. I. Dedusenko and A. I. Brodskiy, Acta Physicochim, URSS, XVII, 314-18 1942. IV. Reaction of Xanthation, Reaction of Mercerization of Cellulose and the Structure of Alkali Cellulose, I. A. Makolkin, The application of the Isotopic Method to the Investigation of the Mechanism of chemical Reaction of Acid anhydrides with Alcohols, 319-22, in English.
109. Transmutation of Elements and the Periodic Law, V. G. Khlopin, Uspekhi Khim, XIII, 181-202, 1944:  
A review of development of the concepts of a chem. element from the time of publication of the periodic table by Mendeleev, 1869 to date.  
81 references.
110. Hydrodynamics of Helium II, L. Landau, J. Exptl. Theoret. Phys. USSR, XIV, 112-15, 1944.  
Theoretical-math. A method is developed for solving problems of the hydrodynamic motion of He II by considering it as an incompressible liquid.
111. Radium Institute Cyclotron, I. Arc type of Ion Source, D. G. Alkhasov, M. G. Meshcheryakov and L. N. Khromchenko, J. Phys. USSR, VIII, 56-61, 1944:  
The construction and operation of the cyclotron are described. Deuterons with energies up to 4 m.e.v. can be obtained.

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**SECRET****112. Distribution of Radioactive Phosphorus**

in Experimental Osteotuberculosis, I. M. Verkhovskaya and G. M. Frank, Byull. Eksptl. Biol. Med., XVIII, No. 7/8, 19-22, 1944.

Fifteen rabbits were injected intravenously or subcutaneously with 5 cc of sterile radioactive  $\text{Na}_2\text{HPO}_4$  soln. Six healthy rabbits and 8 rabbits injected with turpentine served as controls. In animals with exptl. osteotuberculosis more Rd-P was found in the epiphysis than in the diaphysis, and in diseased bones than in healthy bones. The distribution of Rd-P in the bones of "turpentine" rabbits was identical in both legs. In osteoporosis, P is avidly absorbed by the bones but not retained for long, owing to the increased rate of passage of mineral substances. The difference is smoothed out with time. A similar picture was observed in chicks suffering from rickets.

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**SECRET**